

MANAGEMENT OF ENTEROCUTANEOUS FISTULAS

INTRODUCTION

Intestinal fistulae often present with challenges because of their anatomical abnormalities, metabolic disorder and extensive sepsis and poor general condition of the patient. The development of an enterocutaneous fistula is associated with significant morbidity and mortality especially in inflammatory bowel disease, malignancy, and radiation. Total management of intestinal fistulae involves skill in nutritional support, stoma therapy, and elimination of sepsis and carefully timed well adjusted and appropriate surgery. Because most external fistulae follow surgical operations they also present a constant reminder to the surgeon of the falliability of surgical technique and of the stress that falls upon both the surgeon and the patient when a major post operative complication occurs. In the past 20 years, there have been major advances in the management of patients with intestinal fistulae. Early surgical attempts at closure were almost invariably followed by immediate reoccurrence and high death rate. Instead today's patient with external fistula is treated by sustained nutritional support which allows an opportunity for the fistula to close spontaneously which will occur in 70- 80 % of cases.

Even if closure does not occur, the patient is rendered better able to withstand surgical procedures. Fistula closure will be achieved only if sepsis is eliminated. This can be accomplished with either interventional radiological techniques or standard surgical approaches with judicious antibiotic therapy. Failure to eliminate sepsis invariably leads to death. Support of a stoma therapist and advances in the care of skin and diversion of effluent into the stoma bag have contributed a great deal in achieving better results.

AIM OF THE STUDY:

To analyse the etiopathogenesis, management and outcome of enterocutaneous fistula.

MATERIALS AND METHODS:

During the period from June 2003 to June 2005, 28 patients with enterocutaneous fistulae were managed in the Department of Surgical Gastroenterology and Proctology, Madras Medical College, Govt. General Hospital, Chennai. These patients were evaluated in detail for the initial presentation, underlying disease, operative procedures, and the presence of risk factors viz: malnutrition, sepsis and wound management. These cases were managed according to clinical judgement and underlying etiology.

Observation:

Out of 28 Patients, there were 20 males and 8 females. Most of the affected patients were between 15 to 65years of age group.

(Table 1&2) .



Table 1

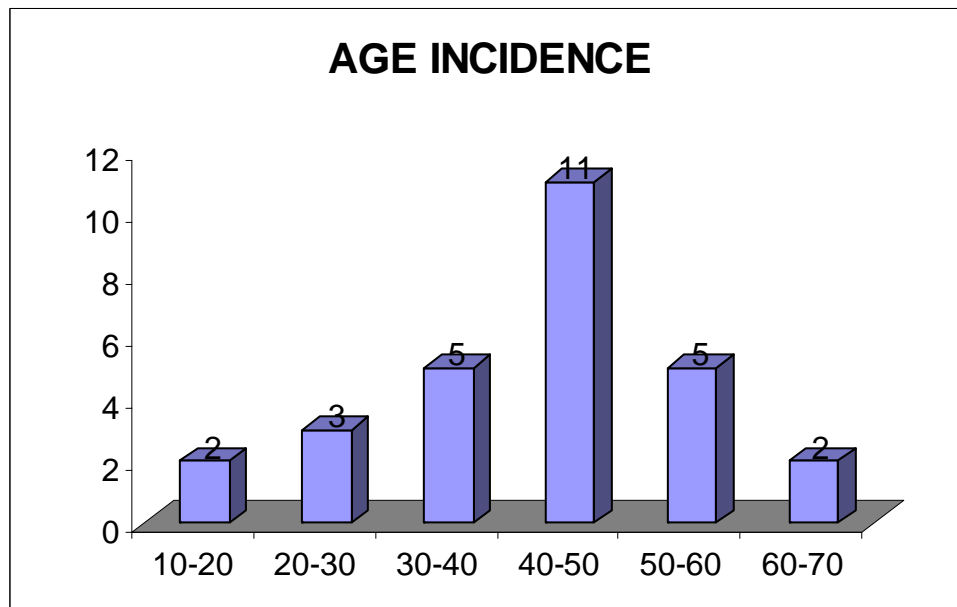


Table 2.

The anatomical site of the fistulae is as follows:
Oesophagogastric 6, oesophagojejunal 1, gastric 2, pancreatic 2,
duodenal 2, jejunal 2, ileal 9, caecal 2 and rectal 2. (Fig: 1)

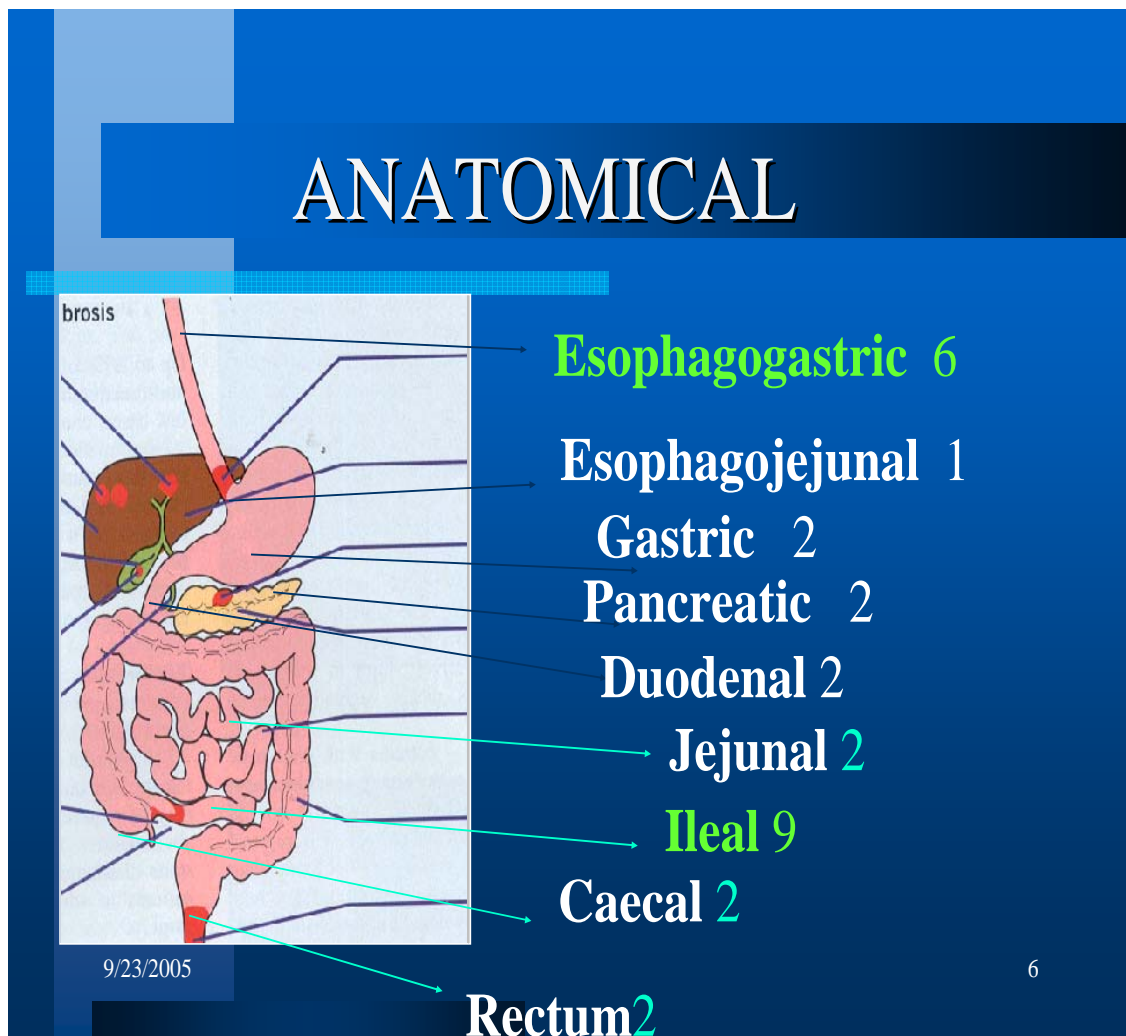


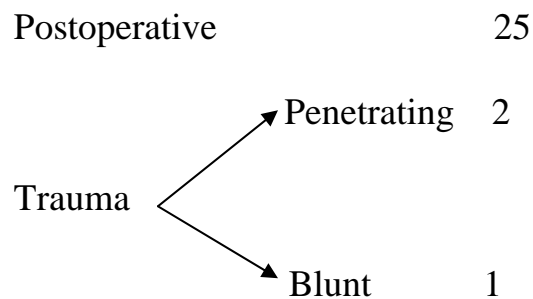
Fig 1.

The physiologic nature i.e the output of fistulae in our series as follows:

Low output	11 (eleven)
Moderate output	4 (four)
High output	13 (thirteen)

Aetiology

In this series there were 25 cases following surgery (post operative) and 3 cases following trauma and among the trauma cases 2 were following penetrating injury and one was following blunt injury (Table 3).



Among the 25 cases following surgery there were 17 males and 8 females, the age group range was 22-65 years. Among the 3 cases following trauma all the 3 were males and the age group range was 15 to 45 years.

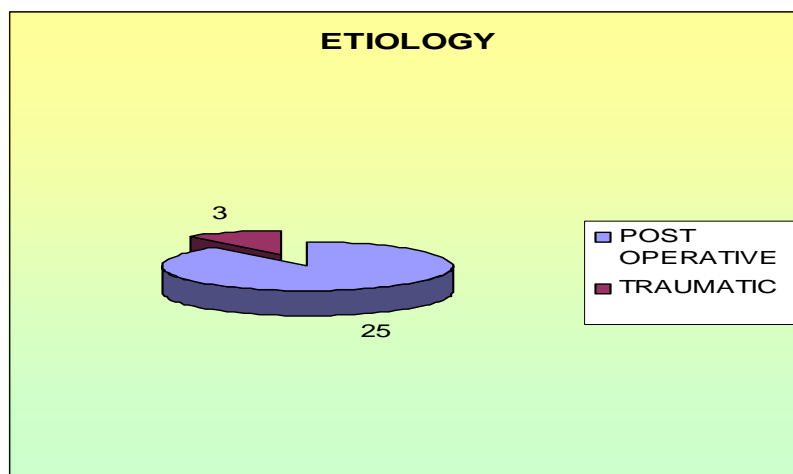


Table 3.

Among the post operative cases, 13 were following anastomotic leak, 6 were following perforation closure 2 cases as appendectomy stump leak and 3 were due to inadvertent injury to the gut and one was due to duodenal blowout. (Table 4). Various type of anastomosis had been performed at various hospitals and the patients were referred to this department following a leak for further management.

Post operative	25
Anastomotic leak	13
Following perforation closure	6
Inadvertent gut injury-ileal	3
Appendectomy stump leak	2
Duodenal blowout	1

Table 4.

Among the 13 cases of anastomotic leak 6 were oesophagogastric and one each of Oesophagojejunal, gastrojejunal & Pancreaticogastric and two each were Ileoileal and Colorectal. (Table 5)

Anastomotic leak	13
oesophagogastric	6
oesophagojejunal	1
Gastrojejunal	1
Pancreaticicogastric	1
Ileoileal	2
Colorectal	2

Table 5.

Among the 6 cases following perforation closure 4 were ileal and 2 were of gastric and duodenal origin. (Table 6).

Among the 3 cases with fistula due to inadvertent gut injury 2 were of ileal origin following hysterectomy and 1 was from the ileum following incisional hernia repair.

Following perforation closure	6
Gastric	1
Duodenal	1
Ileal	4

Table 6.

Among the remaining post operative cases 2 were due to post appendectomy leak and one was due to duodenal blowout.

Among the patients with fistula following trauma, one following blunt trauma was pancreatic fistula and the two following penetrating trauma were following jejunal injury.

SITE OF ORIGIN OF FISTULA WITH OUTPUT:

Location	Number	High output	Moderate output	Low output
Oesophagus	6	-	-	6
Oesophagojejunal	1	-	-	1
Gastric	2	2	-	-
Pancreatic	2	2		-
Duodenal	2	2	-	-
Jejunal	2	2		-
Ileal	9	5	4	-
Caecal	2	-	-	2
Rectum	2	-	-	2
Total	28	13	4	11

Table 7

Management :

Among the 28 cases 13 patients were managed conservatively 15 patients required surgical intervention .With supportive conservative management closure of fistula occurred over a period of 6 weeks to 3 months.

General plan of management:

In this series most of the fistulas were following surgery. Diagnosis was obvious from the history and the site of origin was easily made out by the nature of surgery done. Once the patient was admitted, vigorous resuscitative measures were instituted especially in high output cases with poor general condition. Patients were nursed in prone position on a split bed. Skin care was given by an qualified stoma therapist. Both parenteral nutrition and enteral nutrition were administered according to the requirement. These resuscitative measures were continued till spontaneous closure occurred or the patient was fit enough to undergo surgery, the time period varied from 2 weeks to 3 months. Apart from basic investigations viz haemogram and blood chemistry the following investigations were carried out. Ultrasonogram abdomen was done in all the cases except oesophagogastric fistulas in the neck and there was no collections were noted. CT abdomen was done in 3 cases of ileal fistulae and two

case of pancreatic fistulae and in the case of pancreatic fistula CT showed cystic collection around the body of pancreas. Fistulogram was done in 4 of the ileal fistule which showed the tracts communicating with the bowel. Gasrtrograffin contrast study was done in two of oesophagojejunal and gastric fistulae which showed extravasation of contrast material. (Table 8).

Investigations	USG abdomen	CT abdomen	Fistulogram	Barium Contrast study
Total	22	5	4	2
Oesophagojejunal	1			1
Gastric	2			1
Duodenal	2			
Pancreatic	2	2		
Ileal	9	3	4	
Jejunal	2			
Caecal	2			

Table 8.

The composition of parenteral nutrition mixture is basically 3 types 1 Lt, 1.5 Lt and 2 Lt bags. These mixtures contain appropriate amounts of Nitrogen, Aminoacids, Glucose and Lipids. Total calories of 710, 1265 and 1520 are provided in the 3different volumes. The electrolytes of sodium, potassium, magnesium, calcium, acetate,

chloride and phosphate are provided in the mixtures. The pH of the solution is 6 and of appropriate osmolarity. (Table 9).

The composition of the parenteral nutrition mixture used is as follows:

Component	1 Lt + 100ml lipids 20%	1.5Lt + 250ml lipids 20%	2 Lt + 250ml lipids 20%
Nitrogen (g)	4.6	6.8	9.1
Amino Acids(g)	28	41	55
Glucose (g)	100	150	200
Lipid (g)	20	50	50

Total calories (Kcal)	710	1265	1520
Glucose Calories (Kcal)	400	600	800
Lipid calories (Kcal)	200	500	500
Glucose/ Lipids Ratio	67/33	55/45	62/38

Sodium (mmol)	35	53	70
Potassium (mmol)	30	45	60
Magnesium (mmol)	2.5	3.8	5
Calcium (mmol)	2.3	3.4	4.5
Acetate (mmol)	50	75	100
Chloride (mmol)	40	60	80
Phosphate as HPO ₄ (mmol)	15	23	30
pH	6	6	6
Osmolarity(mOsm/litre)	915	880	900

Table 9.

Oesophageal fistula:

In this series, all the 6 cases of oesophageal fistulas were in the neck. These were cases of carcinoma oesophagus and trans hiatal oesophagectomy had been done with anastomosis of pulled up gastric conduit to cervical oesophagus. The leak developed in the immediate postoperative period within 3-6 days. The output was mainly saliva amounting to less than 200ml. There was no necrosis of conduit in any patient. They were treated by opening of the neck wound and lightly packed dressing and other supportive measures. All these fistulas closed spontaneously over a period of 2-3 weeks time and oesophagogram showed no leak.

One case of oesophago jejunal fistula presenting at the main wound 1 week following total gastrectomy with oesophageal anastomosis for corrosive stricture which had been done elsewhere. The output was less than 200ml/day. After stabilization and skin protection the oesophagogram showed the site of extravasation. Since the output was less and the patient was stable otherwise, conservative treatment continued and closure occurred over a period of 4 weeks.

Gastric fistulas:

In this series of 2 cases of gastric fistulas, one who had undergone surgery elsewhere was following gastrojejunostomy for benign ulcer disease. The patient presented 2 weeks after surgery with fistula in the main wound, high output with stable general condition. Gastrograffin study showed extravasation of contrast. After resuscitation and stabilization with proper skin care management the patient was taken up for surgery after 6 weeks and revision gastrojejunostomy done. Another patient who was presented with gastric fistula following perforation closure on 10th post operative day. Though the output was high initially with good resuscitative measures and skin care the fistula closed with conservative management over a 3 weeks period.

Duodenal fistulas:

Among the two cases of duodenal fistula one was followed by perforation closure and the other one was duodenal blowout following gastrectomy and both presented during the first week of post operative period. Both were through the drainage tube site and high output fistulae. Both were managed with conservative measures and closure occurred over a period of 3 weeks.

Pancreatic fistulas:

Among the 2 cases one case was a fistula following blunt trauma abdomen resulting in a pancreatic fistula initially treated outside presented with drainage tube insitu draining 250 ml per day. The ERCP done outside showed a ductal injury and collection at the body of the pancreas. The ultrasonogram and CT revealed cystic collection at the body level. The patient was a young boy, fully stable & on oral diet. A cystojejunostomy done after 2 weeks of conservative management. The other case was following Whipple's procedure for pancreatic head carcinoma and the leak was from the pancreatico gastrostomy. A leak developed on 7th postoperative day. USG and CT showed no collection and he was treated with supportive measures. The fistula closed spontaneously over 3 week's time. As the patient was already on feeding jejunostomy enteral nutrition was given. The patient was treated with octreotide 100 microgram tds as conservative management.

Small bowel fistulae:

Among the small bowel fistulae in this series, 2 were jejunal and 9 were ileal. Among the jejunal fistulas, 2 were following trauma of penetrating type and presented 10 days after laparotomy. Both the cases were of high output in nature, fluid

replacement, electrolyte balance and skin care were given. The initial surgery was resection and exteriorization of the bowel ends as split stoma. The proximal end acts as an ostomy and through the distal end tube feeding was given. After a period of 6 weeks the definitive surgery of bowel anastomosis was done. Among 9 ileal fistulas, 3 were due to inadvertent injury during previous surgery, 2 leak from previous anastomosis one ileoileal and the other ileotransverse anastomosis and 4 were following perforation closure. one was due to leak from previous anastomosis. All these ileal fistulas presented in the range of 2-3 weeks following previous surgery. In these 9 cases apart from baseline investigations USG abdomen was done to rule out any intraabdominal collection. In 3 cases CT was done. In 4 cases fistulogram showed the anatomy of the tract. These patients were treated with total parenteral nutrition. The initial surgery was to resect the fistula and exteriorize the bowel ends as split stoma proximal one as ostomy and the distal one as mucous fistula. With proper skin care and stoma management definitive surgery of anastomosis was done after a period ranging from 6 weeks to 3 months and in one case after 6 months. One patient in this series died because of uncontrolled sepsis and malnutrition

High output ileal fistula



SKIN CARE

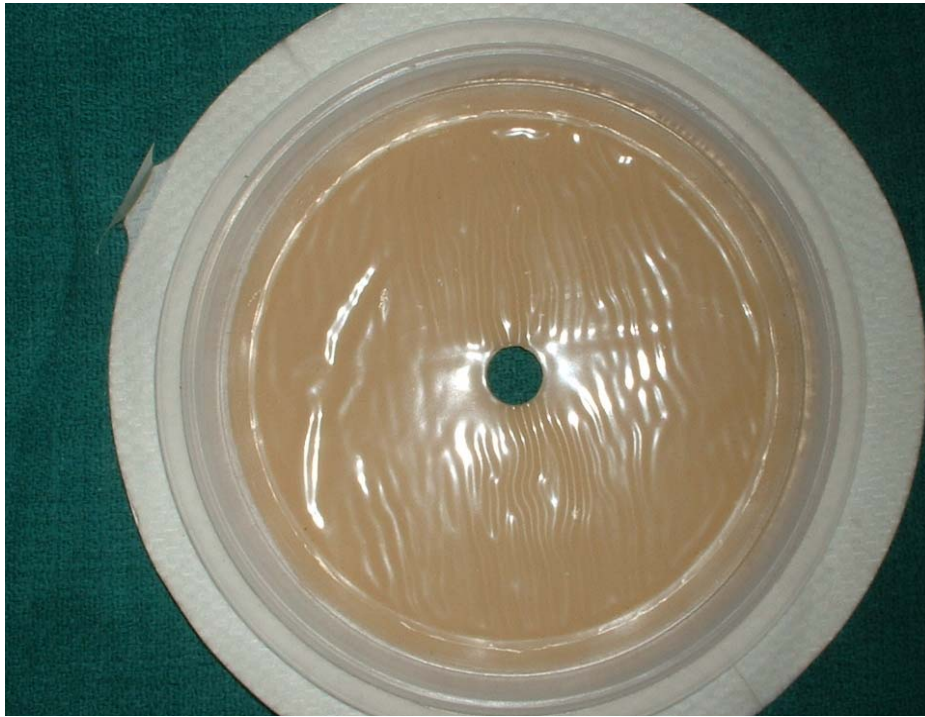
- Barriers.
- Split bed.
- Pouches.
- Sump drains .
- Opsite.



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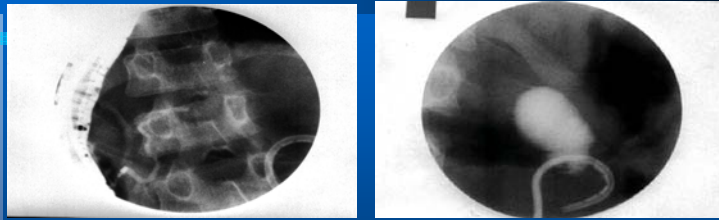
Stoma bag



Split stoma



Fistulogram



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Ileal fistula at the lower end of wound



Healed fistula



Fistula at the bottom of the wound with profound sepsis



Small fistula with low output



Fistula at the middle with infection



Small healing fistula



Complicated fistula with open wound



Stoma bag and appliance



Fistula following incisional hernia



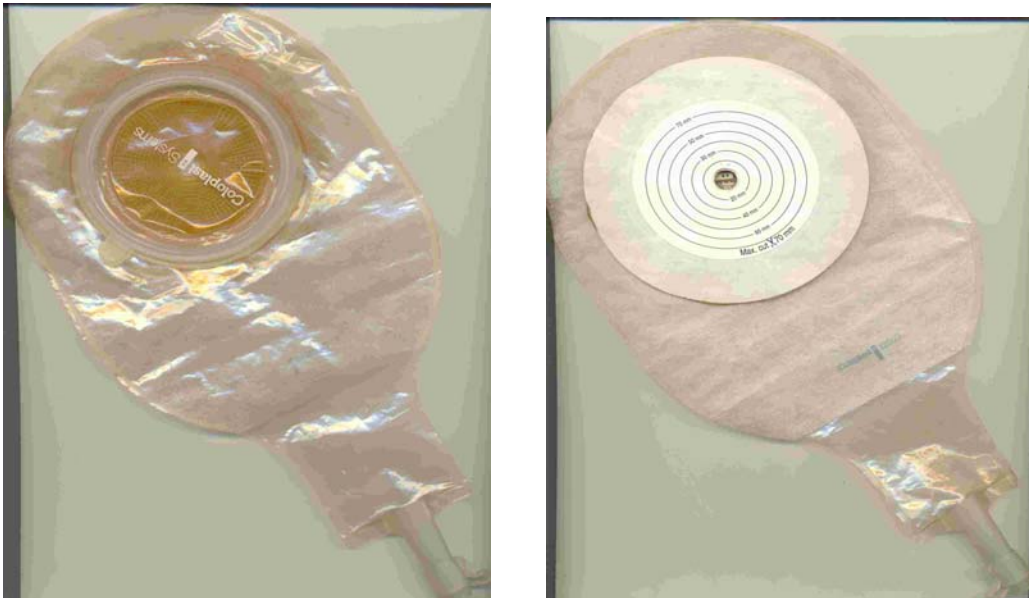
Fistula at the bottom of the large wound



Split bed



Wound Manager (with drainage tube)



Colorectal fistulas:

There were totally 4 cases of colorectal origin and among these 2 were caecal and two were of rectal origin. The caecal fistulas were following appendectomy, done elsewhere and presented to us on the second week of surgery. Both the patients were stable haemodynamically and nutritionally. They were managed with conservative management and the fistula closure occurred over a period of 3 weeks. 2 rectal fistulas were following low anterior resection for malignancy and they presented during the second week following surgery and were of low output and were managed with proximal diverting colostomy and fistula closure occurred spontaneously in 3 weeks period and colostomy closed after 3 weeks.

Results:

Among the 6 cases of oesophagogastric fistula all were managed conservatively and spontaneous closure occurred over a period of 4 to 6 weeks. One case of oesophagojejunal fistula was managed conservatively and spontaneous closure occurred over a period of 3 months. Of the two cases gastric fistule in one revision gastrojejunostomy was done and the other one was managed conservatively and closure occurred over a period of 6 weeks in the conservatively managed case. Of the two cases of pancreatic fistulae one following pancreaticogastrostomy was managed conservatively and closure occurred over a period of 6 weeks. The other one followed by trauma was managed by cystogastrostomy. The two case of duodenal fistulae were managed conservatively and closure occurred over a period 8 to12 weeks. All the jejunal and ileal fistulae were managed by appropriate surgery as exteriorization, split stoma and anastomosis at a later period ranging from 6 weeks to 3 months. Both the caecal fistulae were managed conservatively and closure occurred over a period of 6 weeks. Both the rectal fistulae were managed with proximal diversion colostomy and closure occurred over a period of 6 to 8 weeks. (Table 10).

S.no	Type of fistula	No	Etiology & type of surgery	Treatment	Closure period
1	Oesophagogastric	6	Following Tranhiatal oesophagectomy, leak from oesophagogastric anastomosis.	conservative	4-6 weeks
2	Oesophagojejunal	1	Corrosive stricture, anastomotic leak	conservative	3 months
3	Gastric	2	One following GJ and other following perforation closure	Revision GJ in one case and the other conservative management	6 weeks-spontaneous closure in conservatively managed case
4	Pancreatic	2	One following blunt trauma and other following pancreaticogastrostomy in whipples procedure	Cyst jejunostomy in trauma case and conservative in pancreaticogastrostomy	6 weeks in conservatively managed case
5	Duodenal	2	Following ulcer perforation closure reperforation	Conservative management.	8-12 weeks
6	Jejunal	2	2 following penetrating trauma	Exteriorisation split stoma, proximal as ostomy & distal for feeding purposes definitive anastomosis after 6 weeks	3 weeks to 3 months
7	Ileal	9	3 inadvertent injury during previous surgery and 2 leak from previous anastomosis and 4 following perforation.	Exteriorization proximal ostomy and distal as mucous fistula and definitive anastomosis after 6 weeks	
8	Caecal	2	Following appendectomy	Conservative	6 weeks
9	Rectum	2	Following low anterior resection	Proximal diversion colostomy	6-8 weeks

Table 10.

Discussion:

Definitions: A fistula is an abnormal communication between two epithelial surfaces. Intestinal fistulae are classified into internal, when they connect two or more hollow viscera, or external(enterocutaneous) when a hollow viscus discharges to the body surface.

Fistulae may be 'simple', when there is a single track, or 'complicated' when there are multiple tracks or an associated abscess cavity.

Lateral fistulae are those arising from the side of a hollow viscus whereas end fistulae are those arising from the whole circumference of the involved bowel and where there is no continuity of the gastrointestinal tract.

Management protocol for intestinal fistula.

Early reports on the results of treatment of intestinal fistulas were depressing. Death from a combination of fluid and electrolyte imbalance, malnutrition and sepsis were the rule. Attempts at early surgical closure were associated with very high mortality rates.

Advances in electrolyte replacement and nutritional support have allowed surgeons to maintain patients with intestinal

fistulae in good condition until the fistula closes spontaneously or the patient becomes fit for a definitive surgical correction.

Sheldon and his co-workers (1971) suggested a four-phase approach in management.

Phase – I : Resuscitation & skin protection.

Phase – II : The institution of nutritional treatment.

Phase – III : Investigations and continuing nutritional treatment.

Phase – IV : The definitive treatment plan.

When a fistula develops usually it usually does so over several days with electrolyte imbalance & malnutrition. However in a few instances there may be rapid loss of gastrointestinal secretions with resulting hypovolaemia and severe electrolyte imbalance. The associated sepsis may also produce circulatory collapse.

Thus, the earliest stage of management is correction of hypovolaemia and restoration of fluid and electrolyte balance. Access to circulation is gained via peripheral vein and blood volume restored by plasma substitute or with blood transfusion. Saline containing potassium is infused until vital signs return to normal or adequate urine volume is obtained. Once balance has been achieved infusion of water and electrolytes are continued in quantity sufficient to provide

patients normal daily requirements plus the estimated losses through the fistulas. This requires accurate collection and analysis of fistula effluent.

Protection of skin and collection of fistula effluent.

Skin protection measures should be applied once fistula is recognized as excoriation may make further management difficult. The basic aim of stoma care in fistula is application of effective skin protectives and disposable drainage bag, which will collect the effluent and its accurate measurement. Suction devices, are better avoided because they interfere with closure of fistula and immobilize the patient.

Irving & Beadle (1982) classified skin problems into four categories.

Category 1: Single orifice passing through intact abdominal wall or otherwise healed scar, around which the skin is intact and in reasonably good condition.

Category 2: Single or multiple orifices passing through the abdominal wall close to bony prominences surgical scars other stomas or umbilicus.

Category 3: Fistula presenting through a small dehiscence of the wound.

Category 4: Fistula presenting through a large dehiscence or at the bottom of gaping wounds.

Stoma management in Category 1 fistulas.

Once fistula is recognized, skin around the mouth of the fistula should be treated with silicone barrier preparation. A flat adhesive drainage bag is then applied. The hole in the adhesive should be fashioned as closely as possible to the shape of fistula mouth in order to afford maximum skin protection.

In high output fistulae extra skin protection is required using thin wafers which is not easily dissolved. Stomahesive is ideal, and should be used beneath the flat-flanged bag. Additional safeguard against leakage is using Karaya or orabase around skin edges with wafer for sealing edges.

Stoma Management of category 2 fistulae

Some patients may present with severe excoriation where it may be impossible to apply bags. In such cases, patients should be nursed in face down position on a split bed for up to 48 hours to allow the effluent escape without contacting skin thereby allowing it to recover.

In category 2 fistulas, the best approach is to use large sheets of stomahesive 20 x 20 cm cut to fit around various holes in the abdominal wall. Once satisfactory surface has been achieved the sheet

can be applied pressed into position a large flanged bag being applied on top. Sometimes it may be preferable to have 2 or 3 bags rather than one large bag.

Stoma management in Category 3 fistulas

Most category 3 fistula mouths can be controlled by cutting large area out of one of the large sized protective wafers. To cover the defects very large bags may be required. Large bags are cumbersome and should be replaced by smaller devices as soon as possible.

Stoma management in Category 4 fistulas

Fistula in the depths of a wound dehiscence present major problem. They may be managed initially with low pressure. Suction drainage to remove the effluent. This is continued until wound shrinks to a size that can be managed with bags. Sump drains are ideal for initiating treatment. The edge of the wound should be protected with stomahesive.

Some cases diverting the faecal flow proximal to the fistula is necessary.

Phase II Institution of nutritional treatment.

The aim is to provide adequate and sustained nutritional treatment to maintain the patient until fistula closes spontaneously or

to make the patient fit for surgery. In septic patients, eradication of sepsis is important for full benefit of nutritional treatment.

In high output proximal fistulas after &skin care, parental nutrition is necessary. If a reasonable length of functioning small bowel i.e. > 100cm is available enteral regimens may be useful.

In low out or distal fistula, these regimens can be instituted from the beginning.

Central venous feeding lines

Central lines provide reliable access when compared to peripheral lines in which the veins soon thrombose. Central venous lines allow parenteral nutrition to continue even at home. Parenteral nutrition should provide normal daily requirements plus the estimated loss through the fistula. In septic patients, there will be an increased requirement for nitrogen and energy due to catabolic state and raised energy expenditure.

Nitrogen requirement 3-4 gm is added to daily urinary nitrogen excretion up to 10gm

Energy requirements 2000kcal /day

Enteral nutrition

Enteral regimens are indicated for patients with low output external fistula or distal fistula beyond the terminal ileum.

Even in patients with high output fistulae enteral regimen use may be possible if there is reasonable length of bowel below the fistulae. Access to this segment is possible and is achieved by gastrostomy in cases of oesophageal fistulae and jejunostomy in cases of gastric or duodenal fistulae.

Elemental diets formed of aminoacids or oligopeptides, triglycerides, and simple sugars are used. In patients with distal fistulae enteral regimens can be taken orally. Fine nasogastric tube feeding can be used if the patient cannot tolerate oral intake. Correction of hypoalbuminaemia by infusion of albumin is necessary to raise albumin levels.

Phase III : Investigations & Continuing nutritional treatment

Investigations are necessary to find out

1. origin of the fistulae & anatomy of its track
2. Condition of bowel at the site of fistula or continuing of bowel disease process.
3. Obstruction distal to the fistula.
4. Available normal bowel for enteral nutrition.
5. Associated abscess.

Clinical Assessment

The diagnosis of the presence of external fistula is rarely a problem. Majority follow surgical operations. Post operative fistulae develop from few hours to several days after operation.

Radiological Studies

Fistulography is most valuable if there is a narrow, well defined fistula opening, but doubtful value in high output fistulae or fistulae in the depths of gaping wound. Fistulography will demonstrate the anatomy of the track and abscess cavities.

Barium Contrast studies

Contrast studies are valuable in diagnosis of internal fistula and high output external fistulae. Barium meal can be used for gastric or duodenal fistulae and small bowel fistulae are diagnosed by small bowel enema. Barium enema is used for colonic fistulae. Contrast studies are also valuable in demonstrating the length of the remaining bowel, extent of underlying disease and presence of obstruction distal to the fistula. Late films after 24-48 hours may show contrast in the abscess cavity. ERCP may be indicated in pancreatic and biliary fistulae.

Endoscopy

Though not usually helpful in demonstrating, the fistulae will reveal the underlying disease.

Detection of abscess cavities

Clinical evaluation and ultra sound scanning are helpful in detecting abscess cavities. CT scanning is the most reliable method of detecting abscess cavities. Isotope scanning with In ¹¹¹ labeled leucocytes may be useful.

Phase IV definite treatment plan

Where there is generalized peritonitis or an associated abscess cavity, urgent operative intervention is required. In all the other less acute cases conservative management continued until spontaneous closure occurred or it is obvious that this will not be achieved. The question of how long conservative treatment should be continued is answered by the behaviour of the fistula. If the patient is, improving falling fistula effluent without any time limit conservative measures can be continued. If there are, no signs of spontaneous closure within 4-6 weeks operation should be undertaken to close the fistula.

Principles of surgical operations

Those designed to Improve the patients condition e.g. drainage of abscess, insertion of central lines and creation feeding enterostomies.

Definitive surgeries to close the fistula in staged manner.

General principles in definitive surgery

1. Incisions should be extensive and commence in a virgin area of the abdomen. This will provide good exposure.
2. Resection and anastomosis should not be undertaken as one procedure in septic, hypoalbuminemic or malnourished patients because of high risk of anastomotic leak. Exteriorization of the bowel though produces stomas; the contents are safely discharged on to the body surface rather into the abdominal cavity.

Surgical approach for the closure of the fistula depends on the general condition of the patient.

If the patient is not septic or hypoalbuminemic, malnourished resection and primary end-to-end anastomosis can be undertaken.

On other hand in septic malnourished or hypoalbuminemic, staged procedure is necessary.

The options are

- ✓ Resection of the fistula and exteriorization of the bowel. Anastomosis later when the condition is more favourable.

- ✓ If the resection of the fistula is not possible because of fixity or the patient cannot tolerate major operation proximal bowel can be exteriorized as loop stoma or split stoma.

Using these principles in majority of fistulas successful outcomes can be achieved.

Enterocutaneous fistulas of the digestive tract is a major catastrophe of surgical practice. Around 90% of these fistulas are reported to occur following surgery¹. The 3 major complications of fistulas have been electrolyte disturbances, malnutrition & sepsis. Complications are related to the anatomic site of the fistula, to biochemical and electrolyte content of discharge output and underlying pathology. The ultimate objective in the management of the patients with enterocutaneous fistulas is fistula closure.

Since 1960, when the mortality from priorities was around 60%² there have been major advances in the management of these patients. Chapman proposed management of fistulas in which a set of priorities in the treatment was emphasized. It was recognized that adequate nutritional support and control of sepsis were the priorities. With these priorities, the current reported mortality from enterocutaneous fistulas is in the range of 10- 15 %^{3,4}.

Most of the fistulas occur after operation or instrumentation, other causes include tumour, inflammation and irradiation. Anatomic, physiologic, and etiologic classification are most useful to the surgeon for the management. These data are readily obtained by contrast studies or by CT scan . Fistulograms are more helpful in defining anatomy than contrast CT scans & USG are used to localize undrained collections. Anatomic information has prognostic significance with regard to spontaneous closure ⁵. This information also helps to narrow the differential diagnosis with regard to etiologic process underlying fistula formation. Anatomic characteristics associated with non-healing of fistulas include large adjacent abscesses intestinal discontinuity, distal obstruction, poor adjacent bowel, fistulous tracts less than 2 cm in length enteral defects greater than 1 cm and fistulas arising from certain segments such as stomach, lateral duodenum, ligament of Treitz and ileum. Those anatomic segments with more favourable closure rates include oropharyngeal, oesophageal duodenal stump, pancreato biliary & jejunal.

Physiological classifications are most useful in planning non-operative regimen. The fistula output in a 24-hour period is the most important determinant of physiologic impact of a fistula on a patient. Enterocutaneous fistulas result in external loss of fluids, minerals trace elements, & proteins. These losses can have profound effect on

eventual outcome. Accurate knowledge of fistula output is essential for anticipating metabolic deficits and correcting on going losses. Fistula output is an independent prediction of patient death. 24 hour output from most fistulas decreases before closure ⁶.

Physiologic classification system

Low –output < 200 ml / 24 hours.

Moderate –output < 200 -500 ml / 24 hours.

High –output > 500 ml / 24 hours.⁷ is most useful in planning non-operative nutrition, fluid and electrolyte management.

Malnutrition is a prominent part of the morbidity and mortality associated with enterocutaneous fistulas and present in 55- 90 %. In low output fistulas and high output fistulas parenteral nutrition is usually required . Cause of fistula or pathophysiology is predictive of spontaneous closure and independently predictive of patient death. Fistulas that occur within 7-10 days after G1 surgery , vast majority of them result from anastomotic failure secondary to tension on the anastomosis, poor blood supply, or poor technique with remainder arising from unrecognized bowel injuries during abdominal closure. Fistulas that occur late or those that occur spontaneously are more problematic. Spontaneous causes compose 15-25% ⁸.

Radiation, inflammatory bowel disease, diverticular disease, ischemic bowel, erosion of indwelling tubes, duodenal ulcer perforation pancreatic & gynaecological malignancies are the most common causes in spontaneously occurring fistulas. The remaining 7—85% are post-operative. Operations for cancer, inflammatory bowel disease, or adhesiolysis are the most common operations preceding enterocutaneous fistula formation. In addition, operations for peptic ulcer disease and pancreatitis can lead to post operative fistula formation. Fistulas more commonly occur in the setting of emergency surgery, where the poor preparation or chronic malnutrition predisposes to fistula formation. Some factors are within the control of the surgeon in preventing the fistulas. These are the use of healthy bowel to perform anastomoses well away from inflamed or diseased tissue, pre-operative mechanical bowel preparation, intraluminal or systemic antibiotics, tension free anastomosis, secure abdominal wall closure, maintenance of adequate oxygen carrying capacity in the post operative period and pre-operation maximization of nutritional status. Tarzani et al⁹ outlined the tasks to accomplish in the management of all GI fistulas.

Esophageal fistulas can be of two types: congenital or acquired, thoracic oesophageal fistulas are typically life threatening emergencies because of the organs that are adjacent to the

oesophagus. Rarely oesophago cutaneous fistulas occur ¹⁰. Early recognition and treatment of this type of fistulas are of utmost importance because these fistulas can cause mediastinitis, lung abscess, and pleural effusion. In our series all esophageal fistulas are in the neck and closed on conservative line of management. Cervical oesophageal leaks are secondary to operations for oropharyngeal cancer, cervical spine surgery or leak after anastomosis as a part of an oesophagectomy with oesophageal replacement using stomach or colon ¹¹. Cervical anastomotic fistulas usually present between 3rd & 10th postoperative days. A contrast study can reveal the evidence of perforation or fistula. If there are signs of sepsis, then the risk of extension into mediastinum along the precervical fascia is significant. ¹² Non-operative management consists of broad-spectrum antibiotics, nothing by mouth for several days and careful observation. Any collection or abscess should be drained promptly. Most post anastomotic cervical oesophageal fistulas heal spontaneously. Both the use of a gastric tube for oesophageal replacement and pre operative irradiation are associated with high incidence of post operative anastomotic leak¹³. In the event of a large anastomotic disruption or sepsis, treatment should consist of surgical drainage with or without repair of anastomosis. Cervical oesophagostomy may also be indicated in some patients. Repair depends on the size of the defect

and the ability to find the area of the neck ¹⁴ . Patients with oesophageal fistulas are usually mal nourished & dehydrated. Chronic dysphagia and anorexia in oesophageal cancer can lead to malnutrition, loss of water and electrolytes in saliva or gastric secretions. The anaemia should be corrected with blood transfusions.

Gastric and duodenal fistulas:

Stomach and duodenum each produce 1-2 litres of fluid per day. The overall mortality from this type of fistula was reported by Soeters et al¹⁵ as 62% in 1946 to 1959 but decreased to 23.5% in 1970 to 1975 group receiving hyper alimentation. Sepsis was a major determinant of mortality. In the Cleveland Clinic series, the overall mortality secondary to gastric and duodenal fistula was 29.8% with highest mortality in patients with multiple fistulas ¹⁶ .

Etiology and Recognition.

Gastric and duodenal fistulas are iatrogenic in 70 -90 % of cases ¹⁷ . Most occur after an operation on the stomach, duodenum, or biliary tract. In one review of 13 cases of gastro cutaneous fistulas, average day of recognition was postoperative day 21. In a high output fistula, the diagnosis may be obvious. Diagnostic radiologic evaluation consists of water-soluble contrast study.

Stabilization:

Complication of gastric and duodenal fistulas include severe fluid and electrolyte imbalances, malnutrition, inflammation and abscesses¹⁸.

Protection of skin from fistula effluent is very important. Fistula effluent can cause excoriation & maceration of the skin and delay in wound healing. In managing high output fistula this can be a challenge. Ostomy care nurses are necessary for providing appliances that can collect effluent and protect the skin.

Correction of fluid and electrolytic imbalances:

Because gastrocutaneous and duodenocutaneous fistulas can cause the loss of large amounts of GI secretions, the associated fluid and electrolytic abnormalities can be profound. The effluent consists of highly complicated solutions rich in electrolytes, proteins and other components. In the past nearly one third of patients with gastrocutaneous or duodenocutaneous fistulas were found to develop severe fluid and electrolyte imbalance and 76% of them died¹⁹.

The deficit caused by fistula is directly proportional to the volume and composition of the effluent. Serum sodium, potassium, chloride, urea, bicarbonate should be measured. Haematocrit should be measured to assess anaemia and blood volume should be replaced with blood

transfusions. Patients with hypoalbuminemia are at increased risk and salt poor albumin should be administered. TPN administration can be useful. Somatostatin analogues have been shown to reduce enterocutaneous fistula output.²⁰

In this series somatostatin analogues octrotide had been used in pancreatic fistulas in reducing the fistula effluent.

Pancreatic fistulas:

Etiology and recognition:

Pancreatic fistulas follow pancreatic duct disruption and many develop as a complication of pancreatic secretions may leak internally and form a pseudocyst or abscess. It may form internal or external fistulas. Pancreatic fistulas can also form after surgery for duodenal or pancreatic trauma, pancreatitis or malignancy.²¹

Fielding et al²² reviewed pancreatic fistulas in 23 patients after an episode of acute pancreatitis, 19 of them developed external fistulas, after necrosectomy, abscess drainage, or pseudocyst. 21% of them died. Patients who had low output and spontaneous closure of the fistula had better survival rate. The most common complication resulting from trauma to the duodenum and pancreas is a pancreatic fistula, 70% of which heal spontaneously.²³ If the patient

has an external fistula, the amylase in the effluent is in the range of 1000 to 300000 U/L.

Stabilization:

Once the diagnosis has been made CT scan can identify the presence of abscess or pseudocyst. If the patient has an infected pseudocyst or abscess then drainage, either percutaneously or surgically should be undertaken. Management of pancreatico cutaneous fistulas should be non-operative at least initially. This can be attempted at least for 2-3 weeks. If no improvement occurs by the time, ERCP should be obtained and subsequent surgery planned. The skin should be protected from the enzymes found in pancreatic secretions. A custom-cut stoma bag and protective wafer may help. The assistance of stoma therapist is most helpful in the care of these patients.

Correction of fluid and electrolyte imbalances:

Pancreatic secretions are very hypertonic and rich in bicarbonate and protein. The sodium content approximates that of serum and thus normal saline is used for replacement along with added bicarbonates. These patients should be treated with proton pump inhibitors to decrease gastric acid output.

Nutritional needs are met with either parenteral or enteral access. Pancreatic secretions are diminished by the use of somatostatin analogue at the dose of 250 micrograms/hr.

Jejunal and ileal fistulas:

The most common origin of a GI fistula is the small intestine.²⁴ Nearly 70-90% of them occur after operative procedures.²⁵ The incidence of sepsis and malnutrition is high in patients with jejunal or ileal fistulas.²⁶ Roback and Nicoloff found the ileum to be the site of origin on 50.9% of high output fistulas. Once sepsis and underlying infection have been controlled the majority of these fistulas heal spontaneously.

Etiology and recognition:

Majority of jejunal and ileal fistulas are a result of postoperative complications from anastomotic ruptures and inadvertent full thickness bowel injuries.²⁷ spontaneous causes include inflammatory bowel disease. Cancer, infection, trauma, and pancreatitis.²⁸ other causes are obstruction, inflammation and radiation enteritis. Peritonitis is more common in this group of patients than any other anatomic fistula location. The patient is allowed nothing by mouth, a nasogastric tube is placed, intravenous antibiotics and

intravenous fluids are administered. Some obstructive component is often seen in patients with jejunal or ileal fistulas. USG abdomen and CTscan should be obtained to look for drainable collections. If the patient has complete disruption of an anastomosis this is unlikely to respond to non-operative management.

Stabilization:

Period of stabilization allows the peritonitis to subside and inflammation to resolve. If the fistula does not improve with non-operative treatment the patient needs bowel resection with anastomosis. Immediate operation should be reserved for patients with haemorrhage or abscess with uncontrolled systemic abscess. Otherwise the patient can be stabilized and reserving operation who do not have spontaneous closure of their jejunal or ileal fistulas. Subsequently resection and anastomosis can be done once sepsis has been treated.

Colonic fistulas:

Colonic fistulas are low output fistulas. Colonic fistulas have fewer complications than fistulas located in any other segment of GI tract.²⁹ Any sepsis is often localized and amenable to surgical treatment.

Etiology and recognition:

Colocutaneous fistulas result from diverticulitis, cancer, inflammatory bowel disease, appendicitis, or surgery for treatment of these diseases. Tumour cells remaining at the anastomotic site may impair healing and then lead to a colonic fistula. Another cause is radiation therapy. Patients receiving greater than 5000 CGY for abdominal and pelvic malignancies may develop small or large bowel fistulas. Appendicocutaneous fistulas follow drainage of appendiceal abscess or may follow appendectomy. investigations include contrast enema which demonstrates colocutaneous fistula in nearly 90% of cases.³⁰

Stabilization:

Colon fistulas are less complicated. Sepsis is usually localized dehydration is not common. Significant acid-base imbalances, malnutrition are also less common. Navneet Kaur et. al. reviewed retrospectively 46 patients with enterocutaneous Fistula. Spontaneous closure occurred in 45.6% and the overall mortality was 30.4%.³¹ In this series spontaneous closure occurred in 50% and the mortality is 3.5%.

Conclusion:

With effective enteral nutritional support, good stoma care , and elimination of sepsis, enterocutaneous fistula healed with conservative management in majority of cases. Exteriorization is a pre requisite for complex fistula in a septicaemic patient. Carefully timed well judged and appropriate surgery will restore bowel continuity in this unfortunate group of patients. The role of a qualified stoma therapist in wound and ostomy management is vital to the good outcome.

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